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# Examination of the Reliability and Validity of an Instrument for Measuring Restaurant Website Quality (DINEWEBQUAL)

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## EXAMINATION OF THE RELIABILITY AND VALIDITY OF AN INSTRUMENT FOR MEASURING RESTAURANT WEBSITE QUALITY (DINEWEBQUAL)

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### ABSTRACT

This study was an examination of the reliability and validity of a multiple scale for measuring quality of restaurant website. A questionnaire was administered to a convenience sample of 211 students in Midwestern region of the United States. Respondents were randomly asked about one restaurant website among three family restaurant websites. Confirmatory Factor Analysis (CFA) revealed that three dimensions, titled “Aesthetic,” “Ease of Use,” and “Product Quality Assurance,” have construct validity and Cronbach’s alpha coefficient and composite reliabilities were tested. Empirically, these three dimensions of website quality in family restaurant also were supported by the structural equation modeling developed in this study.

Keywords: CFA, SEM, DINEWEBQUAL, FAMILY RESTAURANT WEBSITE

### INTRODUCTION

Information technology (IT) in foodservice industry has had and continues to have the potential to enable value creation and sustained differentiation in the foodservice industry. For example, restaurants are allocating larger portions of their annual revenue to IT initiatives, according to the 10th annual Restaurant Technology Study (Lorden, 2008). More importantly, technologies that support restaurant management range from relatively simple credit card processing systems to elaborate table management and kitchen production software (Piccoli, 2008). A crucial challenge facing businesses today is to develop

a website that is not only compelling for visitors, but which also achieve business goals. Previous studies have identified a positive and significant relationship between the use of information technologies and the development of a competitive advantage (Bauer, Grether, & Leach, 2002; Cockburn & Wilson, 1996; Lynn, Lipp, Akgün, & Cortez, 2002).

Hospitality firms, such as hotels and restaurants, are an ideal example of a web-based service market which could benefit from the Internet (Lau, Lee, Lam, & Ho, 2001; Murphy, Hofacker, & Racine, 2006). The Internet has become the fastest growing advertising mechanism in the hospitality area by providing substantial market potential and offering a new way to communicate person-to-person (Kasavana, Knuston, & Polonowski, 1997; Van Hoof, Collins, Combrink, & Verbeeten, 1995). Mills, Han, and Clay (2008) contends that the Internet is an indispensable choice in travel-and-tourism particularly for detailed pre-trip preparation as it is universally accessible and contains a large quantity and variety of information.

The restaurant industry has also been affected by Internet innovations. Many restaurant operations, realizing the power of the Web, developed Websites aimed at telling consumers about the products and services they offer using the “if we build it, they will come” philosophy. However, restaurant operators who failed to provide the desired information quickly found their site being ignored by Web surfers. Restaurant practitioners need to address the question of how best to blend Internet technologies with their marketing mix (Namkung, 2007). While most restaurants seem to perceive the importance of integrating the Internet into their business strategy, there is a lack of research on information search behavior of restaurant customers.

Understanding the impact of consumer information searches, as well as the likely predictors and outcomes of those searches is crucial to effective website construction. Restaurant managers still need to take a more direct and continuous role by providing customers not only with the exact information they need, when they need it, but also by providing additional venues by which the customer can interact with the restaurateur (Kimes, 2008). Toward this goal, this study attempts to develop an instrument (DINEWEBQUAL) to measure restaurant website. The major benefit of this study is the digest of a large volume of key factors into one comprehensive model that can be tested and applied to restaurant website development and evaluation.

## **LITERATURE REVIEW**

As internet technologies progress, supported by faster and cheaper computers, the possibilities for adding web-site features grow in number and complexity (Litvin, Blose, & Laird, 2005; Mills, et al., 2008; Piccoli, 2008). In the US, more than 140 million consumers are now online. The exponential growth of the technology has certainly affected foodservice industry also (Mills, et al., 2008; Murphy, Olaru, Schegg, & Frey, 2003). Foodservice management also offer multimedia advertisements and menu options or tie into the customer-relationship-management system by including on-line strategies, such as distribution models and dynamic pricing, as well as other fancy web-site features (Brien, Pollock, Zirpolo, Edward T. Vieira Jr., & Herbold, 2007; Law & Hsu, 2006).

Internet advertisements and e-mail marketing coupled with well-constructed websites are recognized as an important marketing tool (Hoffman & Novak, 1996; Kasavana, et al., 1997; Van Hoof, et al., 1995). There are previous studies identifying a positive and significant relationship between the use

of information technologies and the development of a competitive advantage (Bauer, et al., 2002; Cockburn & Wilson, 1996; Lynn, et al., 2002). For example, e-coupon usage is determined by the trade-off consideration between the costs of and benefits from using coupons (Kang, Hahn, Fortin, Hyun, & Eom, 2006).

The computer science field has a rich history of usability research (e.g., hypertext, adaptive hypermedia, and human-computer interaction) investigating how layout helps the visitors find specific information quicker and easier (Hornoff, 2001; Olston & Chi, 2003). Research of the effects of layout on the visitor's propensity to click is emerging. Studies have shown that advertising banners (Hofacker & Murphy, 1998), celebrity endorsements (Dre`ze & Zufryden, 1997) and non personalized e-mail (Marinova, Murphy, & Massey, 2002) increase clicks. More advertising banners on a web page (Hofacker & Murphy, 1998), manipulating the size and location of images to increase the number of visible links on a page, and using pull-down menus (Brown, 2002) also increase clicks. Animation, though, have a negative influence on clicks (Zhang, 2000) as well large embedded images and Java scripts (Dre`ze & Zufryden, 1997).

With regard to position effects on website, Hoque and Lohse (1999) found that subjects chose items near and at the beginning of an electronic telephone directory more often than the same items in a paper directory. Frick, Ba`chtiger, and Reips (2001) found that fewer participants dropped out of an online survey when asked for personal information at the beginning of the survey rather than when asked at the end of the survey. A measure of Web service quality is important to successful Web marketing because it helps to estimate efficiencies of the Web. Donthu (2001) developed SITEQUAL to measure the perceived quality of an Internet shopping site. It can be divided into two major groups: site-related factors (ease of use, aesthetic design, processing speed, and security) and vendor related factors (competitive value, clarity of ordering, corporate and brand e-quality, product uniqueness, and product quality assurance). Rather than one outstanding attribute, Donthu (2001) pointed out that all nine dimensions are of equal importance, and no one dimension can be ignored if the overall goal is to maximize Web service quality.

Based on the two major dimensions of service quality by Garvin (1991) and Berry and Parasuraman (1991), Madu and Madu (2002) identified 15 dimensions for e-quality: performance, features, structure, aesthetics, reliability, storage capability, serviceability, security and system integrity, trust, responsiveness, product/service differentiation and customization, Web store policies, reputation, assurance, and empathy. Mills (2008) also suggested that identified dimensions can be united according to the discretion of the individual researchers, because some of the dimensions may be closely associated with each other. However, few studies for understanding of customers' opinion of a restaurant business through its website were widespread. Therefore, this research aims to identify the usefulness of Internet marketing for restaurant industry. Specific objectives are (1) to develop an instrument (DINEWEBQUAL) to evaluate restaurant websites, and (2) to investigate customers' behavioral intention with regard to the restaurant website.

## METHODOLOGY

A questionnaire was developed based on a comprehensive review of the hospitality and website quality literature. Mainly, the survey was based on Donthu's (2006) research on website quality and

modified to fit restaurant operations. The survey consisted of four parts. Part one features items for demographics. In part two, DINEWEBQUAL items were provided and this study added more items to investigate the consumer's intention of e-coupon and consumer behavior with the website in part three. Respondents were asked to indicate to which degree they agree with the descriptions about the website and e-coupon. A 5-point Likert-type rating scale will be used for the items' measurement, from (1) strongly disagree to (5) strongly agree.

Between August and November 2009, this study used three family restaurant websites (<http://outback.com/>; <http://www.tgifridays.com/>, <http://www.chilis.com/>) and collect the data using convenience sampling method. Recent research on those three family restaurants (TGIF, Chillis, and Outback Steak House) has reported a higher rate of credit-card use as a selected method of payment after dining (U.S. Census Bureau, 2009) and this assumed those three restaurant can represent family restaurant. As a pilot study, 20 college students were asked to complete the questionnaire. After proofing the face validity the questionnaire, main survey was conducted on 214 respondents.

The data analysis completed in five steps. First, the analysis of variance (ANOVA) was used to examine any significant difference in the overall level of customer satisfaction between three family restaurant website. Second, exploratory factor analyses (EFA) with varimax rotation were conducted to derive the underlying factors of the DINEWEBQUAL attributes. Principal component factors with eigenvalues of 1.0 or greater were rotated by the varimax analysis. Only factor loadings of 0.4 or higher were retained, indicating good correlations between the items and the factors to which they belonged. To test the reliability and internal consistency of each factor, Cronbach's Alpha of each factor was determined and the factors with Alpha of 0.6 were retained for further analysis. Third, a measurement model was tested using confirmatory factor analysis (CFA). Factors extracted in the factor analysis (EFA) were used as the latent variables. The multiple-item scales of four constructs were subjected to a CFA to determine whether the manifest variables reflected the hypothesized latent variables. The adequacy of the items was assessed by composite reliability, convergent validity, and discriminant validity. As a final step of data analysis, once the measures were validated, structural equation modeling (SEM) was used to test the validity of the proposed model. SEM used to compare the magnitude of DINEWEBQUAL dimensions between website qualities in contributing to the level of customer loyalty.

## **RESULTS & CONCLUSION**

Table 1 shows the socio-demographic characteristics of respondents in this study. Out of 220 questionnaires were collected, and 211 questionnaires (95.9%) were used for the statistical analysis. Females constituted 61.6% of respondents. Most of respondents (82.5%) were undergraduate students. Eighty four (39.8%) of the respondents evaluated TGI Friday's website, Fifty nine (28.0%) and sixty eight (32.2%) of respondents evaluate the Outback Steak house website and Chill's website respectively.

Table 1.  
*Demographic Characteristics of the respondents*

Variable	Frequency ( <i>n</i> = 211)	Percent (%)
Gender		
Female	129	61.1
Male	82	38.9
Classification		
Undergraduate Students	174	82.5
Graduate Students	34	16.11
Others	3	1.4
Restaurants		
TGI Fridays	84	39.8
Outback Steak House	59	28.0
Chilli's	68	32.2

ANOVA analysis (Table 2) showed most of items regarding website quality are not significant different between three websites and any of the demographic variables such as gender, age, and education levels. However some important differences were observed. Overall, the website of outback steak house was evaluated as well designed website with good picture showing their brand image.

Table 2.  
*ANOVA RESULTS*

Variables	Degree of Freedom	F-test	Significance level
Creative	2	5.099	0.007
Quality of Pictures	2	8.718	< 0.001
Brand Image	2	8.985	< 0.001
Quick Process	2	6.168	0.002
Intention to revisit the website	2	5.399	0.005

CFA (*n* = 211) and evaluation of Cronbach's alpha were conducted (Table 3). All DINEWEBQUAL attributes with factor loadings of 0.45 or greater were retained in the analysis. The

final instrument contained 14 statements related to four dimensions describing Aesthetic ( $\alpha = 0.602$ ), Ease of Use ( $\alpha = 0.687$ ), Product Quality Assurance ( $\alpha = 0.613$ ) and Website Loyalty ( $\alpha = 0.808$ ). Cumulatively, item-to-total Cronbach's alpha of 0.838 revealed that the 14 items had strong internal consistency (Nunnally, 1978). All of the composite reliabilities of the constructs were over the cutoff value of .50, ensuring adequate internal consistency of multiple items for each construct (Hair, Anderson, Tatham, & Black, 1998). Convergent validity was satisfied in that all confirmatory factor loadings exceeded .452. In addition, the average variance extracted (AVE) of all constructs exceeded the minimum criterion of .45, indicating that a large portion of the variance was explained by the constructs. The AVEs were greater than the squared correlations between any pair of constructs, suggesting discriminant validity. The four-factor confirmatory measurement model demonstrated the soundness of its measurement properties. The ratio of  $\chi^2$  (105.798) to degrees of freedom (71) was 1.490 ( $p < 0.005$ ). Given the known sensitivity of the  $\chi^2$  statistics test to sample size, several widely used goodness-of-fit indices demonstrated that the confirmatory factor model fit the data well (NFI=0.801, CFI=0.919, IFI=0.925, RMSEA=0.060).

Table 3.

*Cronbach's Coefficients, Factor Loadings of CFA, Mean, Standard Deviation, CR, AVE*

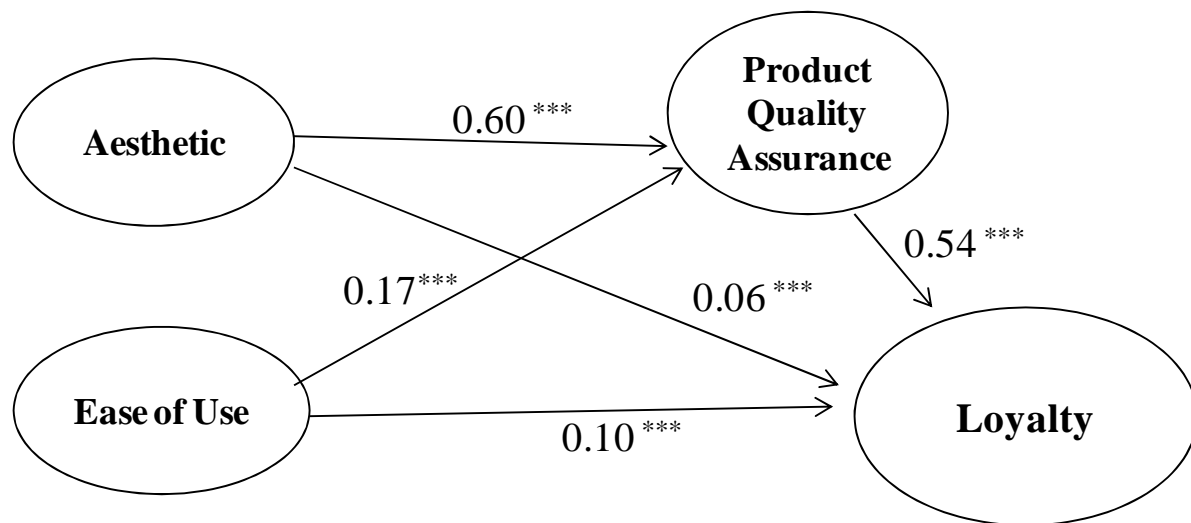
Subscales (0.838*)	Factor Loading	Mean	SD	Composite reliabilities	AVE
Aesthetic (0.602*)				0.742	0.334
Color	0.522	4.284	0.686		
Creative	0.583	4.009	0.743		
Picture	0.625	4.341	0.748		
Ease of Use (0.687*)				0.813	0.314
Convenience	0.533	4.199	0.696		
General Information	0.571	4.081	0.742		
Location	0.457	4.398	0.685		
Quick Process	0.636	4.028	0.804		
Ease Access	0.588	3.981	0.697		
Product Quality Assurance (0.613*)				0.661	0.451
Restaurant quality	0.707	3.555	0.834		
Feel Food	0.634	3.639	0.982		
Web Loyalty (0.808*)				0.810	0.432
Web revisit	0.767	3.237	1.065		
Best Website	0.525	3.493	0.943		
Recommend to friends	0.676	3.085	1.143		
Recommend to Family	0.917	3.275	1.005		

Notes: \* Cronbach's alpha coefficient

As a second step, the proposed model regarding family restaurant was estimated (Figure 1). The estimation produced the following statistics:  $\chi^2(71) = 105.798$  ( $p < 0.005$ ),  $\chi^2/df = 1.490$ , NFI = 0.801, CFI = 0.919, IFI = 0.925, RMSEA = 0.062. The model's fit as indicated by these indexes was satisfactory



and path coefficients were analyzed. Most of paths including factor loadings and path coefficient are significant. The path for predicting a positive relationship between aesthetic and product quality assurance was supported with highest path coefficient ( $\gamma_{11} = .60$ ,  $t = 1.66$ ,  $p < .05$ ). The results show that having a good picture, creativity, and well designed website may create product quality assurance. However, the path between product assurance and customer loyalty was also not significant ( $\gamma_{12} = .06$ ,  $t = .184$ ,  $p = .854$ ). In the mean time, ease of use does not influence on customer loyalty neither ( $\gamma_{22} = .10$ ,  $t = .339$ ,  $p = .735$ ). Otherwise, ease of use significantly less influence on the product quality assurance ( $\gamma_{21} = .17$ ,  $t = 1.38$ ,  $p < .05$ ). The findings suggest that good looking and ease of use are significant predictors of product quality assurance and loyalty. Moreover customer who earned product assurance via website will be loyal customer for their restaurant ( $\beta_{12} = .54$ ,  $t = 2.09$ ,  $p < .05$ ). These finding shows that the family restaurant website can provide quality assurance but it is not possible to create loyal customer for their restaurant.



Notes: \*\*\* All path coefficients are significant ( $p < 0.001$ )

<b>CMIN/DF = 1.490</b>	<b>NFI = 0.801</b>
<b>RMSEA = 0.062</b>	<b>CFI = 0.919</b>
<b>TLI = 0.880</b>	<b>IFI = 0.925</b>

Figure 1.  
*Family Restaurant Website Quality Model*

## CONCLUSION AND IMPLICATION

A DINEWEBQUAL instrument for measuring customers' perceptions of family restaurant website quality was examined in this study. Overall, the results indicated that this instrument can be used in family restaurant to measure website quality. In addition, aesthetic factor is core of family restaurant website for generating product quality assurance. DINEWEBQUAL is a psychometrically rigorous instrument that measures the perceived quality of an Internet shopping site. This simple scale is reliable, valid, multidimensional, and parsimonious. It will benefit internet restaurant site designers and researchers, and may be used to evaluate and track site quality. With this study, website improvements can be suggested to owners of restaurants, based on internet user's behavioral preference. Indeed, the Internet has changed the way people do business and interact. Marketers are desperate to take competitive advantage of the Internet to survive in this new e-world. The study on website evaluation also provides marketers with information about how this newly emerging sales promotional tool works in the minds of consumers. Further research is needed for continuous reexamination of this instrument for measuring family restaurant website quality.

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